Precalc Warm Up # 10-3

Verify

1. $\dfrac{\tan^2 x + 1}{\tan^2 x} = \csc^2 x$

Solve $[0, 2\pi)$

2. $\sin 2x \sin x = \cos x$

3. $3 \tan \dfrac{x}{2} + 3 = 0$

February 22, 2017

In Exercises 19–24, find the exact values of sin(u/2), cos(u/2), and tan(u/2) by using the half-angle formulas and the given information.

19. $\sin u = \frac{5}{13}, \quad \frac{\pi}{2} < u < \pi$

$\boxed{21.}$ $\tan u = -\frac{5}{8}, \quad \frac{3\pi}{2} < u < 2\pi$

23. $\csc u = -\frac{5}{3}, \quad \pi < u < \frac{3\pi}{2}$

In Exercises 25–28, use the half-angle formulas to simplify the given expression.

25. $\sqrt{\dfrac{1 - \cos 6x}{2}}$ 26. $\sqrt{\dfrac{1 + \cos 4x}{2}}$

$u = 6x$

$\dfrac{u}{2} = 3x$

$\sin 3x$

In Exercises 31–40, rewrite the given product as a sum.

31. $6 \sin \frac{\pi}{4} \cos \frac{\pi}{4}$

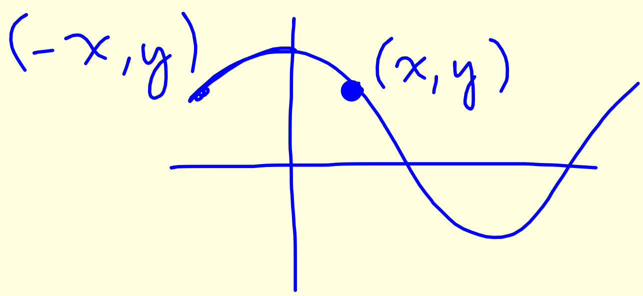
$\boxed{33.}$ $\sin 5\theta \cos 3\theta$

35. $5 \cos(-5\beta) \cos 3\beta$

$\boxed{37.}$ $\sin(x + y) \sin(x - y)$

39. $\sin(\theta + \pi) \cos(\theta - \pi)$

$\cos(-x) = \cos x$



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In Exercises 41–50, express the given sum (or difference) as a product.

41. $\sin 60^\circ + \sin 30^\circ$

43. $\cos \frac{3\pi}{4} - \cos \frac{\pi}{4}$

45. $\cos 6x + \cos 2x$

47. $\sin(\alpha + \beta) - \sin(\alpha - \beta)$

49. $\cos(\phi + 2\pi) + \cos \phi$

In Exercises 51–72, verify the given identity.

57. $\cos 3\beta = \cos^3\beta - 3\sin^2\beta\cos\beta$

$\cos(\overset{u}{2\beta} + \overset{v}{\beta}) =$

$\cos 2\beta\cos\beta - \sin 2\beta\sin\beta$

$(2\cos^2\beta - 1)\cos\beta - 2\sin\beta\cos\beta\sin\beta$

$2\cos^3\beta - \cos\beta - 2\sin^2\beta\cos\beta$

$\cos^3\beta + (\cos^3\beta - \cos\beta) - 2\sin^2\beta\cos\beta$

$\cos^3\beta + \cos\beta(\cos^2\beta - 1) - 2\sin^2\beta\cos\beta$

$\cos^3\beta + \cos\beta(-\sin^2\beta) - 2\sin^2\beta\cos\beta$

$\cos^3\beta - 3\sin^2\beta\cos\beta$

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In Exercises 73–84, find all solutions in the interval $[0, 2\pi)$.

$\boxed{81.}$ $\sin \overset{u}{6x} + \sin \overset{v}{2x} = 0$ $\longrightarrow 2\sin\left(\frac{8x}{2}\right)\cos\left(\frac{4x}{2}\right) = 0$

$\sin 4x \cos 2x = 0$

83. $\dfrac{\cos 2x}{\sin 3x - \sin x} = 1$

In Exercises 73–84, find all solutions in the interval $[0, 2\pi)$.

$\boxed{81.}$ $\sin 6x + \sin 2x = 0$

83. $\dfrac{\cos 2x}{\sin 3x - \sin x} = 1$

use sum to product:
$\sin u - \sin v$

$$\frac{\cos 2x}{2\cos 2x \sin x} = 1$$

$$2\sin x = 1$$

$$x = \sin^{-1}\left(\tfrac{1}{2}\right)$$

$$x = \frac{\pi}{6}, \frac{5\pi}{6}$$

Reminders:

Work only ONE side when you verify an identity.

When solving, if you square both sides, check for extraneous solutions.

If you are factoring to solve, be sure to get 0 on one side first. Sum to Product formulas are really helpful here. If it is quadratic but can't be factored, take a breath, then use the quadratic formula :)

When you are solving problems with multiple angles, get the general solution first and use that to generate all answers.

If answers aren't going to be exact, draw a picture to help you get all of your answers. Your calculator will only give you one!

HW: Chapter review, p. 442

#25, 29, 41, 47-63 odd
skip 53, and do #52, 56

Group Test Tomorrow
Individual Test Friday

Bring SL Book Friday for homework!

Group Verify:

1. $\dfrac{\csc^2 x}{\cot x} = \csc x \sec x$ $\qquad \dfrac{1}{\sin x} \cdot \dfrac{1}{\cos x}$

$\dfrac{1}{\sin^2 x} \cdot \tan x =$

$\dfrac{1}{\sin^{\cancel{2}} x} \cdot \dfrac{\cancel{\sin x}}{\cos x} =$

$\dfrac{1}{\sin x} \cdot \dfrac{1}{\cos x} =$

$\csc x \sec x = \csc x \sec x$

2. $\dfrac{\sec x - 1}{1 - \cos x} = \dfrac{\sec x}{1} \cdot \dfrac{1 - \cos x}{1 - \cos x}$

$= \dfrac{\sec x - \sec x \cos x}{1 - \cos x}$

$= \dfrac{\sec x - \frac{1}{\cancel{\cos x}} \cdot \frac{\cancel{\cos x}}{1}}{1 - \cos x}$

$\dfrac{\sec x - 1}{1 - \cos x} = \dfrac{\sec x - 1}{1 - \cos x}$